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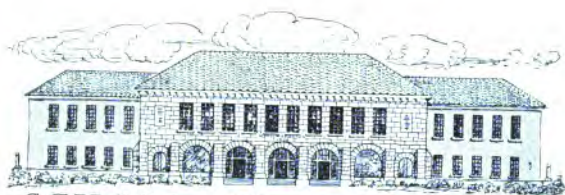


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THE FIXED STARS  
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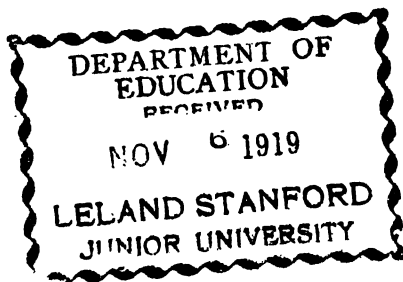
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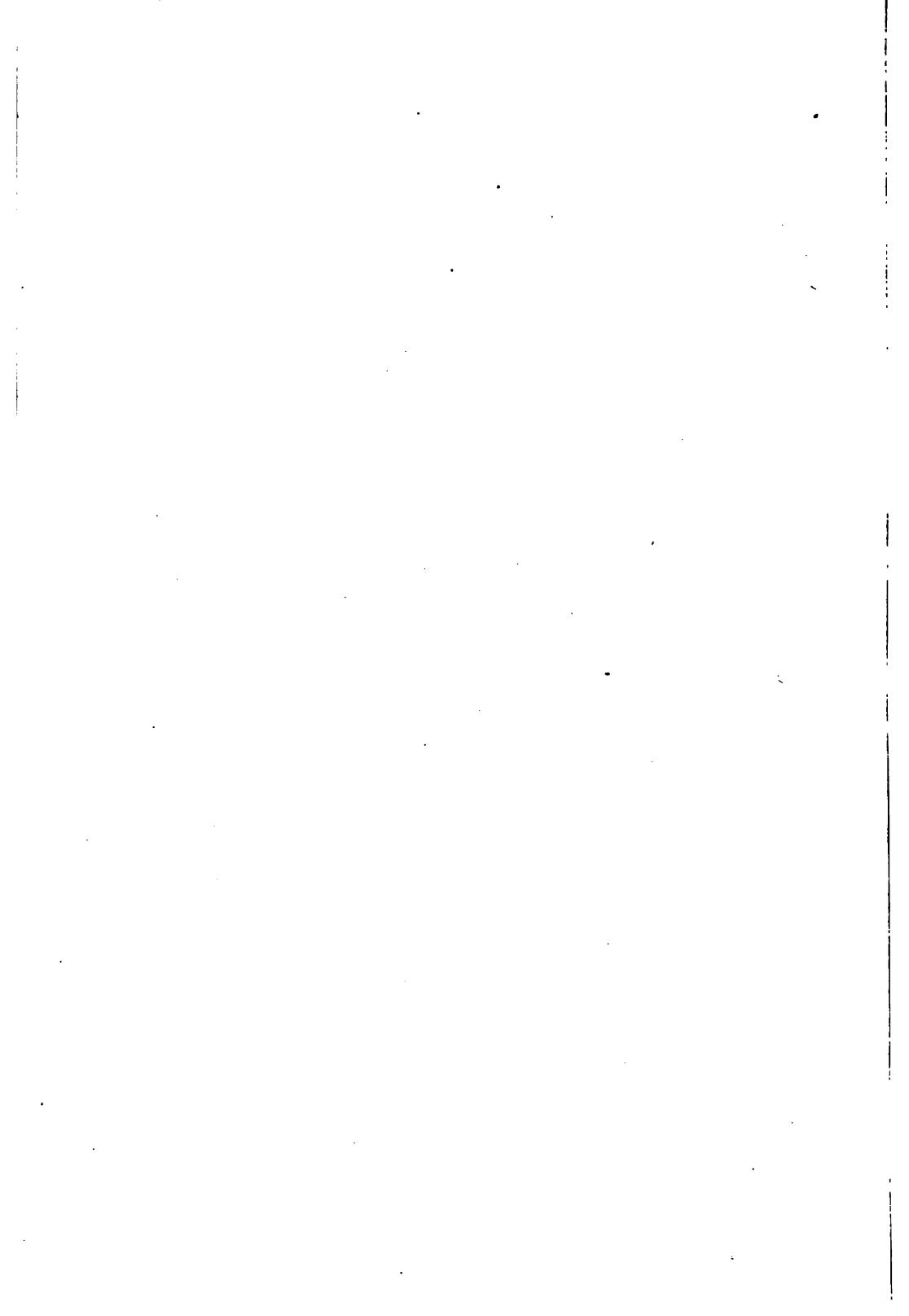


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# THE FIXED STARS.

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## *Maps for Out-Door Study.*

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### FIRST LESSONS IN ASTRONOMY,

ADAPTED TO USE IN SCHOOLS.

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BY ELIAS COLBERT, M. A.

*For some time Superintendent of the Dearborn Observatory.*

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CHICAGO:  
GEORGE SHERWOOD & CO.

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## THE FIXED STARS.

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This little work is offered as an easy introduction to a study of the Heavens. It exhibits the relative positions of the most prominent stars; and the most natural method of arranging them in groups, to agree with the generally accepted division into constellations. It will be found very convenient in the out-door exercise of comparing the map with its original in the sky. The book may be used alone, or in connection with an astronomical text book.

These maps have the advantage of being small and compact, without crowding. They contain all the stars of the first, second, third and fourth magnitudes, with a few of the fifth. The old fashioned figures which encumber the globes, and most other star maps, are discarded. The principal stars in each constellation are connected by lines forming a distinctive outline, that can be easily traced in the sky, and as easily remembered. The maps "overlap" to a considerable extent, enabling the student to pass readily from one to another in the series.

The scale of the maps is about  $20^{\circ}$  to the inch. The names of constellations are printed in capital letters; a few words in smaller capitals are the names of lesser groups, each of which forms only a part of a constellation. The proper names of the most prominent stars are printed in the ordinary type. Except in a few cases, the direction of the name corresponds to the position of the star, or constellation, when on the meridian above the pole.

The page opposite each map is intended to assist in the study of that map. The names of the principal constellations are given, with their English equivalents; and the number of stars that can be seen in the constellation with the average naked eye, on a clear night, in the absence of the moon. The positions of one or more of the principal stars in the constellation are also given; first the Greek letter by which the star is known, then the proper name, if any; the Right Ascension in hours, minutes and seconds, and the North or South Declination, in degrees and minutes, for the beginning of the year 1875; and lastly the date when the star is on the meridian above the pole at nine o'clock in the evening. The time of meridian passage for any other date, and the times of rising and setting, may be found by the aid of the following tables.

There is no good reason for the general lack of ability to recognize the principal fixed stars, when we see them in the sky; other than the absence of star maps simple enough to admit of being studied by the average boy or girl. These maps are intended to fill the void, and prepare the way for an understanding study of the sublime phenomena of the heavens.

THE AUTHOR.

## NUMBER AND MAGNITUDE.

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The following table shows the relative quantities of light that we receive from the sun and moon, and from an *average* star of each magnitude visible with the naked eye; also the number of stars in each class, and the characters used in the following maps to represent the principal stars:

	<i>Light Units.</i>	<i>Number.</i>	<i>Character.</i>
Sun,	2,000,000,000,000	----	
Full Moon,	3,000,000	----	
Sirius,	350	----	★
First Magnitude,	110	20	★
Second Magnitude,	43	64	★
Third Magnitude,	16 $\frac{3}{4}$	201	★
Fourth Magnitude,	6 $\frac{1}{2}$	400	★
Fifth Magnitude,	2 $\frac{1}{2}$	1100	★
Sixth Magnitude,	1	3200 to 8000	
Nebula,			⊙

A line appended to a star-character (thus ★) shows that it can be seen as double, with the naked eye, or through a small telescope. Two lines indicate a triple star.

The number of stars of the sixth magnitude is variously stated; from about 3,200 to nearly 8,000, by different observers. This class includes all of less prominence than the fifth, that are visible with the naked eye; and the number depends on the seeing power of the individual, and on the condition of the atmosphere. The vision of some persons is much more penetrating than that of others; and the same person can see a greater number of stars from the top of a mountain than from its base, the lowest air being the least pure.

Hence the total number of stars visible with the naked eye ranges from about 5,000 to 10,000; of which only 685 belong to the first four classes, and are sufficiently prominent to be noticed by the unpracticed observer.

## CULMINATION, RISING, AND SETTING.

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The motion of the earth in her orbit causes the stars to appear to gain on the Sun one day in each year, or at the rate of two hours per month, or 3m. 56s. per day; and any fixed star passes the meridian 3m. 56s. earlier each day than on the day preceding. The following table shows the Right Ascension of the meridian, or the STAR TIME, at noon, on the 1st, 11th, and 21st days of each month, to within two minutes, for any year during the present century :

	1st.		11th.		21st.
March .....	22h. 38m.	----	23h. 17m.	----	23h. 57m.
April .....	0 40	----	1 19	----	1 59
May .....	2 38	----	3 17	----	3 57
June .....	4 41	----	5 20	----	6 00
July .....	6 39	----	7 18	----	7 58
August .....	8 41	----	9 20	----	10 00
September .....	10 44	----	11 23	----	12 03
October .....	12 42	----	13 21	----	14 01
November .....	14 44	----	15 23	----	16 03
December .....	16 42	----	17 21	----	18 01
January .....	18 44	----	19 23	----	20 03
February .....	20 46	----	21 25	----	22 05

If we subtract the right ascension of the meridian at noon, from the right ascension of a star (increased by 24 hours, if necessary), the remainder will be the time after noon when the star will pass the meridian. If this remainder exceed 12 hours, subtract 12 hours from it, and the second remainder will be the time after midnight. The meridian passage of a star is often called its CULMINATION.

The semi-diurnal arc (*semi*, half) of a star with any declination, given in the left-hand column, may be found for any latitude, given in the first line, from the following table. The arcs for other declinations and latitudes may be known,

nearly enough for purposes of ordinary observation, by a simple proportion.

## LATITUDE AND DECLINATION, ALIKE.

(BOTH NORTH, OR BOTH SOUTH.)

Lat.	0	10	20	30	40	45	50	55	60
Dec.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
60	6 5	7 16	8 41	h. m.	-----	-----	-----	-----	-----
55	6 4	7 03	8 10	9 46	-----	-----	-----	-----	-----
50	6 4	6 53	7 47	8 57	h. m.	-----	-----	-----	-----
45	6 3	6 44	7 29	8 26	9 52	h. m.	-----	-----	-----
40	6 3	6 37	7 14	8 00	9 03	9 52	h. m.	-----	-----
35	6 3	6 31	7 02	7 39	8 27	9 01	9 50	h. m.	-----
30	6 3	6 26	6 52	7 21	8 00	8 26	8 57	9 46	h. m.
25	6 2	6 22	6 42	7 06	7 35	7 55	8 19	8 51	9 40
20	6 2	6 17	6 33	6 52	7 14	7 29	7 47	8 10	8 41
15	6 2	6 13	6 25	6 39	6 55	7 05	7 18	7 34	7 56
10	6 2	6 09	6 18	6 26	6 37	6 44	6 53	7 03	7 16
5	6 2	6 06	6 10	6 14	6 20	6 23	6 28	6 33	6 40
0	6 2	6 03	6 03	6 03	6 03	6 03	6 04	6 04	6 05

## LATITUDE AND DECLINATION, UNLIKE.

ONE NORTH AND THE OTHER SOUTH.

0	6 2	6 03	6 03	6 03	6 03	6 03	6 04	6 04	6 05
5	6 2	5 59	5 56	5 52	5 46	5 47	5 40	5 35	5 30
10	6 2	5 55	5 48	5 40	5 29	5 23	5 16	5 05	4 54
15	6 2	5 52	5 41	5 27	5 11	5 03	4 50	4 33	4 14
20	6 2	5 48	5 33	5 14	4 52	4 39	4 21	3 59	3 29
25	6 2	5 44	5 24	5 02	4 31	4 13	3 49	3 18	2 30
30	6 3	5 40	5 14	4 45	4 08	3 43	3 11	2 22	-----
35	6 3	5 35	5 04	4 27	3 40	3 07	2 18	-----	-----
40	6 3	5 29	4 52	4 06	3 05	2 16	-----	-----	-----
45	6 3	5 23	4 39	3 43	2 16	-----	-----	-----	-----
50	6 4	5 16	4 21	3 11	-----	-----	-----	-----	-----
55	6 4	5 05	3 59	2 22	-----	-----	-----	-----	-----
60	6 5	4 54	3 29	-----	-----	-----	-----	-----	-----

When the sum of the latitude and declination is equal to, or greater than  $90^\circ$ , the star neither rises nor sets, being always above the horizon, or always below it.

If the semi-diurnal arc be subtracted from the time of culmination, the remainder is the time of rising. If the semi-diurnal arc be added to the time of culmination, the sum is the time of setting.

## BINARY AND VARIABLE STARS.

The following are some of the most prominent binary stars. The magnitudes of most of the constellations are stated and periods of revolution.

$\xi$  in Ursa Major,  $3\frac{1}{2}$  and 5; 60·6 years.

$\mu$  in Draco, 648 years.

$\gamma$  in Corona Borealis, 5 and  $5\frac{1}{2}$ ; 41 years.

$\delta$  in Cygnus, 3 and 8; 336 years.

No. 61 in Cygnus,  $5\frac{1}{2}$  and 6; perhaps 450 years.

$\alpha$  in Gemini,  $2\frac{1}{2}$  and 3; about 1000 years.

$\zeta$  in Cancer, 60·5 years. A third star revolves around the pair in 600 years.

$\alpha$  in Canis Major, 1 and 8; 49·6 years.

$\gamma$  in Leo,  $2\frac{1}{2}$  and 4; about 400 years.

$\gamma$  in Virgo, 3 and 3; 175 years.

Two companions to  $\mu$  in Boötes, 230 years.

$\xi$  in Boötes,  $4\frac{1}{2}$  and  $6\frac{1}{2}$ ; 127·4 years.

$\alpha$  in Centaurus, 1 and 4; 84 years.

$\zeta$  in Hercules, 3 and 6; 34·6 years.

No. 70 in Ophiucus,  $4\frac{1}{2}$  and 6; 90 years.

$\lambda$  in Ophiucus, 4 and 6; 233 years.

$\xi$  in Scorpio, 5 and 5; 96 years.

$\zeta$  in Aquarius,  $3\frac{1}{2}$  and  $4\frac{1}{2}$ ; perhaps 1000 years.

$\alpha$  in Pisces, 4 and 5; about 2600 years.

$\delta$  in Equuleus,  $4\frac{1}{2}$  and 5; 12 years.

$\alpha$  in Pegasus, 11 years. Shortest known period.

The following are some of the most prominent variable stars, with their periods:

$\beta$  in Lyra,  $3\frac{1}{2}$  to  $4\frac{1}{2}$ , in 12·91 days.

$\delta$  in Cepheus, 4 to 5, in 5·279 days.

$\alpha$  in Cassiopea, 2 to 3, in 79·1 days.

$\beta$  in Perseus, 2 to 4, in 2·8673 days.

- $\rho$  in Perseus,  $3\frac{1}{2}$  to 4, in 3'953 days.  
 $\sigma$  in Cetus, 1 to 9, in 331'336 days.  
 $\alpha$  in Orion, 1 to  $1\frac{1}{4}$ , in 196 days.  
 $\epsilon$  in Auriga,  $3\frac{1}{2}$  to  $4\frac{1}{2}$ , in 350 days.  
 $\zeta$  in Gemini, 4 to  $4\frac{1}{2}$ , in 10'157 days.  
 $\eta$  in Argo, 1 to 7, in 46 years or more.  
 $\alpha$  in Hydra, 2 to  $2\frac{1}{4}$ , in 55 days.  
 $\alpha$  in Hercules, 3 to 4, in 88'5 days.  
 $\eta$  in Aquila  $3\frac{1}{2}$  to  $4\frac{1}{2}$ , in 7'276 days.  
 $\beta$  in Pegasus, 2 to  $2\frac{1}{4}$ , in 31'5 days.

The following are the distances of a few of the nearest fixed stars, the unit being the mean distance of the earth from the sun; also the number of years required by light to traverse the distance.

Star.	Sun Distances.	Light Years.
$\alpha$ in Centaurus, - -	275,000 - -	4'33
No. 61 in Cygnus, - -	470,000 - -	7'4
Sirius, - - - -	700,000 - -	11'0
Procyon, - - - -	760,000 - -	12'0
$\eta$ in Cassiopea, - -	1,270,000 - -	20'0
Vega, - - - -	1,375,000 - -	21'7
Capella, - - - -	1,750,000 - -	27'6
Arcturus, - - - -	2,200,000 - -	34'7
Pole Star, - - - -	2,267,000 - -	35'7

## THE GREEK ALPHABET.

The following are the small letters of the Greek alphabet, with their names; the capitals are not used.

$\alpha$ Alpha,	$\iota$ Iota,	$\rho$ Rho,
$\beta$ Beta,	$\kappa$ Kappa	$\sigma$ Sigma,
$\gamma$ Gamma,	$\lambda$ Lambda,	$\tau$ Tau,
$\delta$ Delta,	$\mu$ Mu,	$\upsilon$ Upsilon,
$\epsilon$ Epsilon,	$\nu$ Nu,	$\phi$ Phi,
$\zeta$ Zeta,	$\xi$ Xi,	$\chi$ Chi
$\eta$ Eta,	$\omicron$ Omicron,	$\psi$ Psi,
$\theta$ Theta,	$\pi$ Pi,	$\omega$ Omega.





URSA MAJOR — The Greater Bear. 136 stars.

- $\alpha$ , Dubhe. 10h. 56m. 08s. North  $62^{\circ} 26'$ . April 20.  
 $\beta$ , Merak is  $5^{\circ} 22'$  south from  $\alpha$ , nearly in line with Pole star.  
 $\gamma$ , Alkaid. 13h. 42m. 36s. North  $49^{\circ} 56'$ . June 1.

URSA MINOR — The Lesser Bear. 27 stars.

- $\alpha$ , Pole-star. 1h. 12m. 55s. North  $88^{\circ} 39'$ . November 23.  
 The center of the letter  $\alpha$  shows the position of the north pole.  
 $\beta$ , Kochab. 14h. 51m. 5s. North  $74^{\circ} 40'$ . June 19.

DRACO — The Dragon. 132 stars.

- $\alpha$ , Thuban. 14h. 1m. 08s. North  $64^{\circ} 58'$ . June 6.  
 $\gamma$ , Etanin. 17h. 53m. 42s. North  $51^{\circ} 30'$ . August 4.

LYRA — The Harp. 48 stars.

- $\alpha$ , Vega. 18h. 32m. 42s. North  $38^{\circ} 40'$ . August 14.

CYGNUS — The Swan. 145 stars.

- $\alpha$ , Arided. 20h. 37m. 10s. North  $44^{\circ} 50'$ . September 15.  
 $\beta$ , Albireo. 19h. 25m. 41s. North  $27^{\circ} 42'$ . August 27.  
 No. 61, double, not shown, is  $2^{\circ}$  west from  $\tau$ , between  $\nu$  and  $\nu$ .

CEPHEUS — King of Ethiopia. 89 stars.

- $\alpha$ , Alderamin. 21h. 15m. 36s. North  $62^{\circ} 3'$ . September 24.

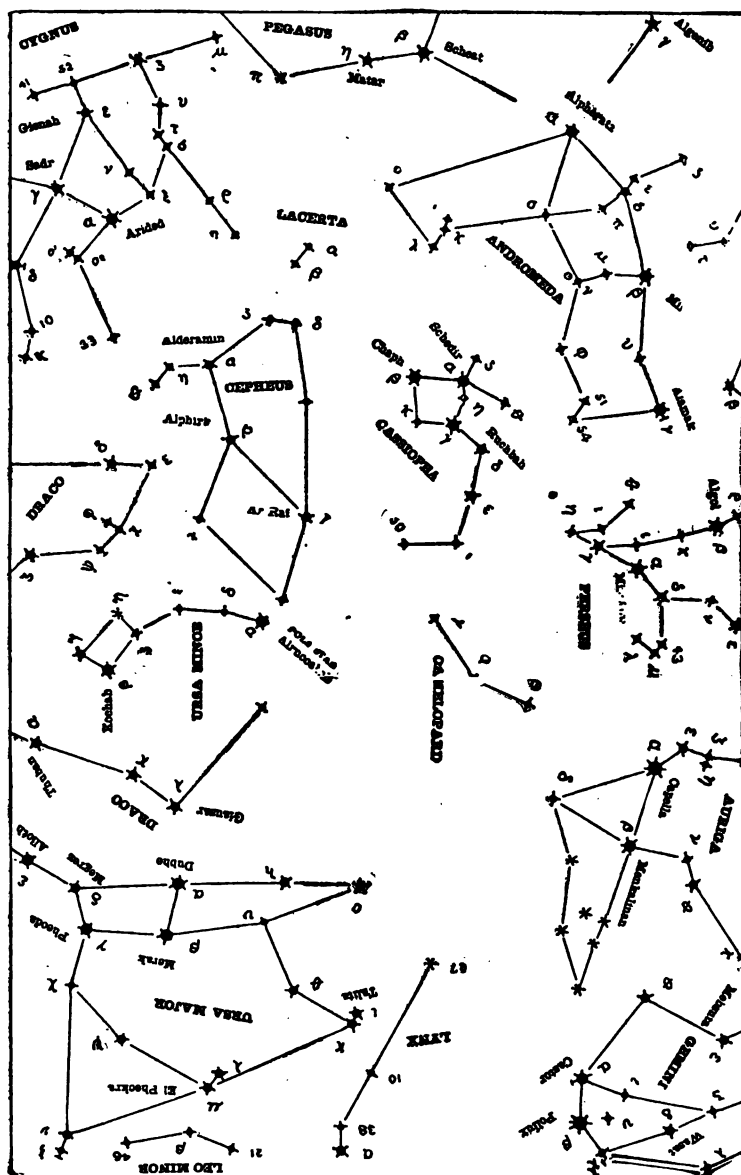
CANES VENATICI — The Hounds of Bootes. 55 stars.

- $\alpha$ , Cor Caroli. 12h. 50m. 11s. North  $39^{\circ} 0'$ . May 19.

CORONA BOREALIS — The Northern Crown. 26 stars.

- $\alpha$ , Alphecca. 15h. 29m. 24s. North  $27^{\circ} 8'$ . June 28.

The Milky Way runs through Cygnus, and the southern part of Cepheus.



## CASSIOPEA — The Lady in Her Chair. 67 stars.

- $\alpha$ , Schedir. oh. 33m. 26s. North  $55^{\circ} 51'$ . November 14.  
 $\beta$ , Chaph. oh. 2m. 31s. North  $58^{\circ} 28'$ . November 6.

## ANDROMEDA — Daughter of Cassiopea. 86 stars.

- $\alpha$ , Alpheratz. oh. 1m. 56s. North  $28^{\circ} 24'$ . November 6.  
 $\beta$ , Mirach. 1h. 2m. 44s. North  $34^{\circ} 57'$ . November 21.  
 $\gamma$ , Alamak. 1h. 56m. 14s. North  $41^{\circ} 44'$ . December 5.  
 Nebula near  $\nu$  is visible with the naked eye.

## CAMELOPARD. 84 stars. Modern constellation.

- $\alpha$ , 4h. 41m. 12s. North  $66^{\circ} 6'$ . January 16.

## LACERTA — The Lizard. 31 stars. Modern.

- $\alpha$ , 22h. 26m. 9s. North  $49^{\circ} 38'$ . October 12.

## LYNX — The Lynx. 44 stars. Modern.

- $\alpha$ , 9h. 13m. 26s. North  $34^{\circ} 55'$ . March 25.

## LEO MINOR — The Lesser Lion. 21 stars. Modern.

- $\beta$ , 10h. 20m. 39s. North  $37^{\circ} 21'$ . April 11.

## Part of PERSEUS. 78 stars.

- $\alpha$ , Mirfak. 3h. 15m. 24s. North  $49^{\circ} 25'$ . December 25.

## Part of AURIGA. 69 stars.

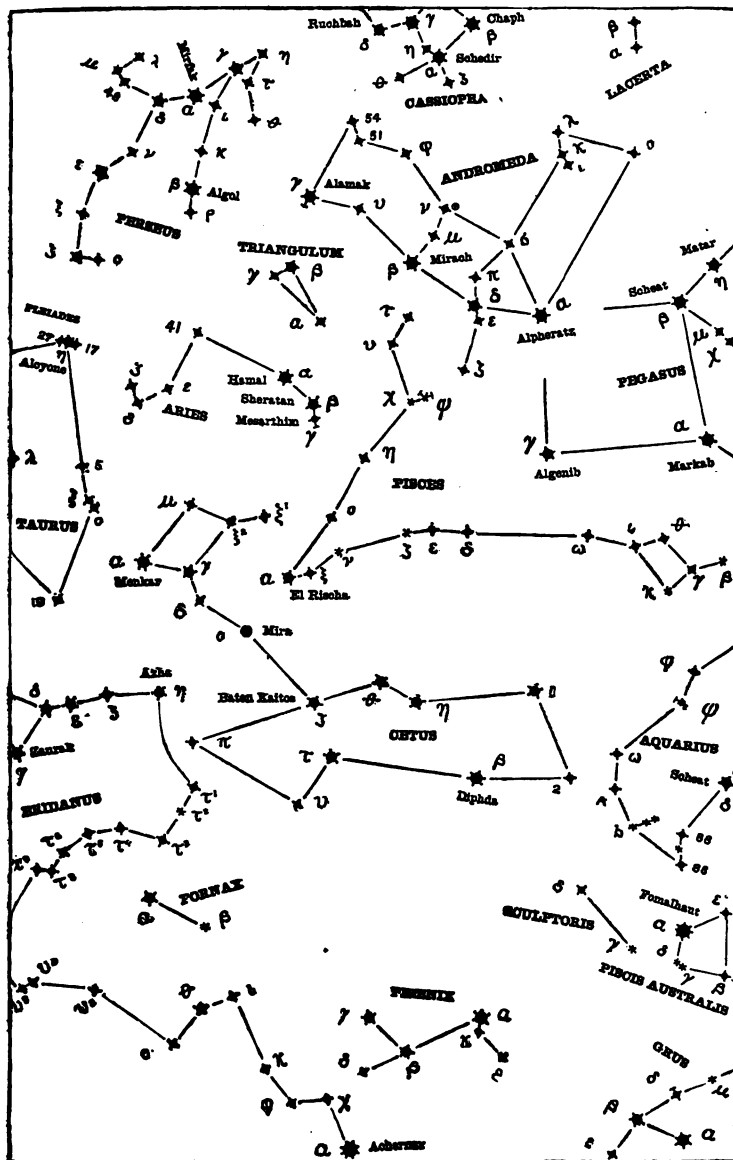
- $\alpha$ , Capella. 5h. 7m. 27s. North  $45^{\circ} 52'$ . January 22.

## Part of GEMINI. 53 stars.

- $\beta$ , Pollux. 7h. 37m. 40s. North  $28^{\circ} 20'$ . March 1.

For Ursa Major, Ursa Minor, Draco, Cepheus, and Cygnus, see page 10.

The Milky Way runs through Cygnus, and Lacerta; the southern portions of Cepheus and Cassiopea; and the middle of Perseus and Auriga.



Alpheratz, Markab, Scheat, and Algenib, form the Square of Pegasus.

PERSEUS — A Grecian Hero. 78 stars.

- $\alpha$ , Mirfak. 3h. 15m. 24s. North  $49^{\circ} 25'$ . December 25.  
 $\beta$ , Algol, variable. 3h. 0m. 2s. North  $40^{\circ} 28'$ .

TRIANGULUM — The Triangle. 15 stars.

- $\beta$ . 2h. 2m. 7s. North  $34^{\circ} 24'$ . December 6.

ARIES — The Ram. 50 stars.

- $\alpha$ , Hamal. 2h. 0m. 8s. North  $22^{\circ} 52'$ . December 6.

CETUS — The Whale. 98 stars.

- $\alpha$ , Menkar. 2h. 55m. 45s. North  $3^{\circ} 36'$ . December 20.  
 $\sigma$ , Mira, variable. 2h. 13m. 2s. South  $3^{\circ} 33'$ .  
 $\beta$ , Diphda. 0h. 37m. 19s. South  $18^{\circ} 40'$ . November 15.

PISCES — The Fishes. 75 stars.

- $\alpha$ , El Risha. 1h. 55m. 35s. North  $2^{\circ} 10'$ . December 4.  
 $\beta$  is 22h. 57m. 31s. North  $3^{\circ} 8'$ . October 20.

PHOENIX. 13 stars. Modern.

- $\alpha$  is 0h. 20m. 6s. South  $42^{\circ} 59'$ . November 10.

SCULPTORIS — Apparatus of the Sculptor. 12 stars. Modern.

- $\delta$  is 23h. 43m. 32s. South  $28^{\circ} 53'$ . November 1.

FORNAX — The Chemical Furnace. 14 stars. Modern.

- $\alpha$ . 3h. 6m. 46s. South  $29^{\circ} 29'$ . December 22.

The Milky Way includes the principal stars in Cassiopea, the northern part of Andromeda; and all the prominent stars in Perseus that are north from Algol.



## ORION — The Hunter. 115 stars.

$\alpha$ , Betelgeuse. 5h. 48m. 24s. North  $7^{\circ} 22'$ . February 2.

$\delta$ , Mintaka. 5h. 25m. 37s. South  $0^{\circ} 24'$ . January 27.

$\beta$ , Rigel. 5h. 8m. 32s. South  $8^{\circ} 21'$ . January 22.

Mintaka, Alnilam, and Alnitak form the Belt of Orion;  $\epsilon$ ,  $\theta$  and  $\zeta$  form the sword.  $\theta$  consists of 6 stars, surrounded by a nebula.

## AURIGA — The Wagoner. 69 stars.

$\alpha$ , Capella. 5h. 7m. 27s. North  $45^{\circ} 52'$ . January 22.

$\beta$ , Menkalinan. 5h. 50m. 22s. North  $44^{\circ} 56'$ . February 2.

## TAURUS — The Bull. 121 stars.

Pleiades, 6 stars; principal is  $\eta$ , Alcyone. 3h. 40m. 3s. North  $23^{\circ} 44'$ . December 31. Telescope shows 499 stars

$\alpha$ , Aldebaran. 4h. 28m. 45s. North  $16^{\circ} 15'$ . January 12.

$\beta$ , El Nath. 5h. 18m. 24s. North  $28^{\circ} 30'$ . January 25.

## LEPUS — The Hare. 22 stars.

$\alpha$ , Arneb. 5h. 27m. 13s. South  $17^{\circ} 55'$ . January 27.

## ERIDANUS — The River Po. 84 stars.

$\eta$ , Azha. 2h. 50m. 19s. South  $9^{\circ} 24'$ . December 18.

$\beta$ , Cursa. 5h. 1m. 42. South  $5^{\circ} 15'$ . January 21.

$\alpha$ , Achernar (page 62). 1h. 33m. 3s. South  $57^{\circ} 52'$ . Nov. 29.

## COLUMBA — The Dove. 10 stars. Modern.

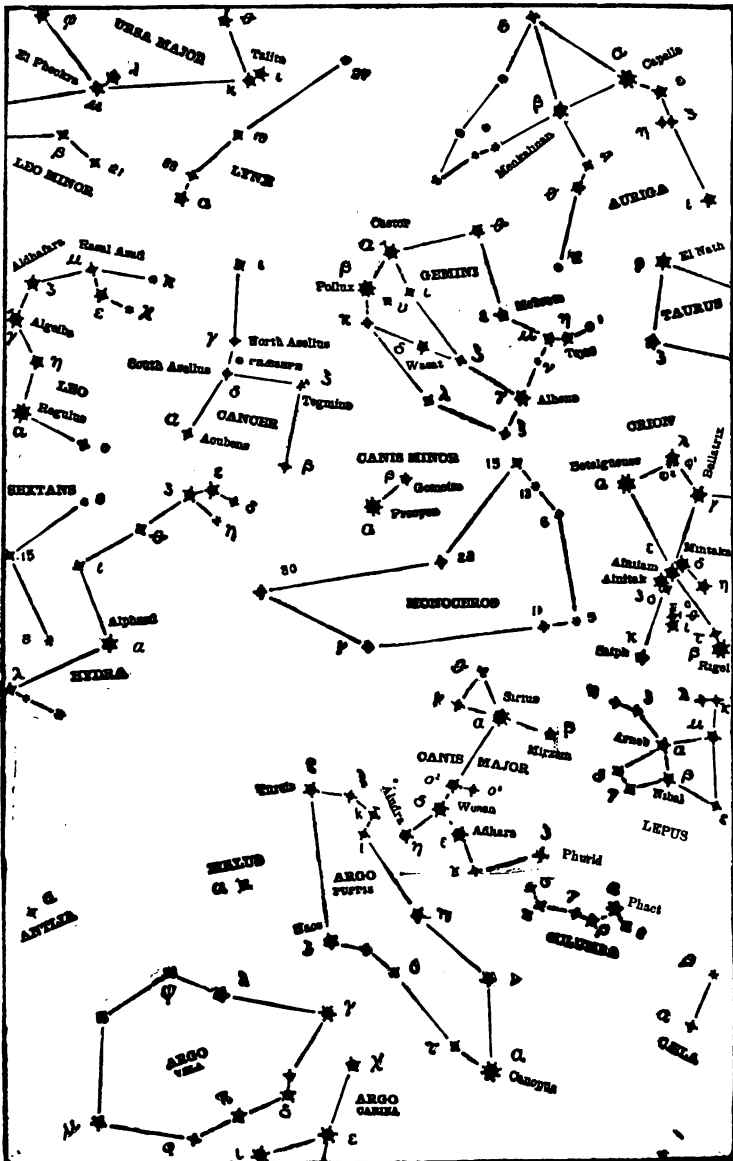
$\alpha$ , Phact. 5h. 35m. 8s. South  $34^{\circ} 9'$ . January 29.

## CÆLA — The Tools of the Sculptor. 16 stars. Modern.

## DORADO — The Sword Fish. 7 stars. Modern.

The Milky Way passes through the northern part of Andromeda, through Perseus and Auriga, and east of Orion.





## AURIGA — The Wagoner. 69 stars.

$\alpha$ , Capella. 5h. 7m. 27s. North  $45^{\circ} 52'$ . January 22.

$\beta$ , Menkalinan is  $7\frac{1}{2}$  east from Capella.

## GEMINI — The Twins. 53 stars.

$\beta$ , Pollux. 7h. 37m. 40s. North  $28^{\circ} 20'$ . March 1.

$\alpha$ , Castor, is a wide binary, one white, the other green. Period of revolution doubtful.

$\gamma$ , Tejat, 6h. 7m. 20s. North  $22^{\circ} 32'$ . February 6.

## CANIS MAJOR — The Greater Dog. 39 stars.

$\alpha$ , Sirius. 6h. 39m. 38s. South  $16^{\circ} 33'$ . February 15.

## CANIS MINOR — The Lesser Dog. 15 stars.

$\alpha$ , Procyon. 7h. 32m. 45s. North  $5^{\circ} 33'$ . February 28.

## CANCER — The Crab. 47 stars.

$\alpha$ , Acubens. 8h. 51m. 39s. North  $12^{\circ} 20'$ . March 20.

Præsepe, or Beehive Nebula. Just west from  $\gamma$  and  $\delta$ .

## MONOCEROS — The Unicorn. 66 stars. Modern.

No. 15 is 6h. 33m. 56s. North  $10^{\circ} 0'$ . February 13.

## ARGO — The Ship. 242 stars.

$\alpha$ , Canopus. 6h. 21m. 11s. South  $52^{\circ} 38'$ . February 10.

$\zeta$ , Naos. 8h. 2m. 13s. South  $23^{\circ} 57'$ . March 7.

Argo is subdivided into Carina (the keel); Vela (the sails); and Puppis (the stern). Some make Malus (the mast) a part of Argo.

The Milky Way passes through  $\gamma$  and  $\zeta$  in Auriga; includes El Nath on the west and Tejat on the east; thence through Monoceros, between the two dogs, and through Argo.



## URSA MAJOR — The Greater Bear. 136 stars.

$\alpha$ , Dubhé. 10h. 56m. 0s. North  $62^{\circ} 26'$ . April 20.

$\eta$ , Alkaid. 13h. 42m. 36s. North  $49^{\circ} 56'$ . June 1.

A line from Merak, through Dubhé, passes near the pole star.

$\xi$  is binary, with period of revolution of 61 years. Is 11h. 11m. 31s. North  $32^{\circ} 14'$ . April 24.

## LYNX — The Lynx. 44 stars. Modern.

$\alpha$ , is 9h. 13m. 26s. North  $34^{\circ} 55'$ . March 25.

## LEO — The Lion. 76 stars.

$\alpha$ ,  $\gamma$ ,  $\gamma$ ,  $\zeta$ ,  $\mu$ , and  $\epsilon$ , form the Sickle of Leo.

$\alpha$ , Regulus. 10h. 1m. 43s. North  $12^{\circ} 35'$ . April 7.

$\beta$ , Denebola. 11h. 42m. 41s. North  $15^{\circ} 16'$ . May 2.

$\gamma$ , Algeiba, is binary. Period 402.6 years.

## CORVUS — The Crow. 15 stars.

$\gamma$  is most prominent. 12h. 9m. 23s. South  $16^{\circ} 51'$ . May 9.

## CRATER — The Cup. 14 stars.

$\delta$  is most prominent. 11h. 13m. 6s. South  $14^{\circ} 6'$ . April 25.

## HYDRA — The (land) Snake. 74 stars.

$\alpha$ , Alphard, variable. 9h. 21m. 27s. South  $8^{\circ} 7'$ . March 27.

$\epsilon$ , in the head, is 8h. 40m. 10s. North  $6^{\circ} 53'$ . March 17.

$\gamma$ , see next map, is 13h. 12m. 8s. South  $22^{\circ} 31'$ . May 25.

## SEXTANS — The Sextant. 17 stars. Modern.

No. 15 is 10h. 1m. 32s. North  $0^{\circ} 14'$ . April 7.

## ANTLIA — The Air Pump. 3 stars. Modern.

$\alpha$  is 10h. 21m. 36s. South  $30^{\circ} 26'$ . April 12.



## VIRGO — The Virgin. 100 stars.

$\alpha$ , Arista, 13h. 18m. 37s. South  $10^{\circ} 31'$ . May 26.

$\beta$ , Zavijava, 11h. 44m. 11s. North  $2^{\circ} 28'$ . May 3.

$\gamma$ , Porrima, is binary. Period 175 years.

## BOOTES — The Herdsman, or Bear Driver. 85 stars.

$\alpha$ , Arcturus. 14h. 9m. 58s. North  $19^{\circ} 50'$ . June 8.

$\beta$ , Nekkar. 14h. 57m. 14s. North  $40^{\circ} 53'$ . June 20.

Arista, Denebola, Cor Caroli, and Arcturus, form the Diamond of Virgo.

## COMA (BERENICES) — The Hair of Berenice. 39 stars.

$\alpha$  is nearly half way between Arcturus and Denebola. South from No. 15 is a cluster of stars of the 5th and 6th magnitudes.

## LIBRA — The Balance. 31 stars.

$\alpha^2$ , Zubenesch. 14h. 43m. 58s. South  $15^{\circ} 31'$ . June 17.

$\beta$ , Zubenelg. 15h. 10m. 17s. South  $8^{\circ} 55'$ . June 24.

## CENTAURUS — The Centaur. 41 stars.

$\epsilon$ , is 13h. 13m. 35s. South  $36^{\circ} 3'$ . May 25.

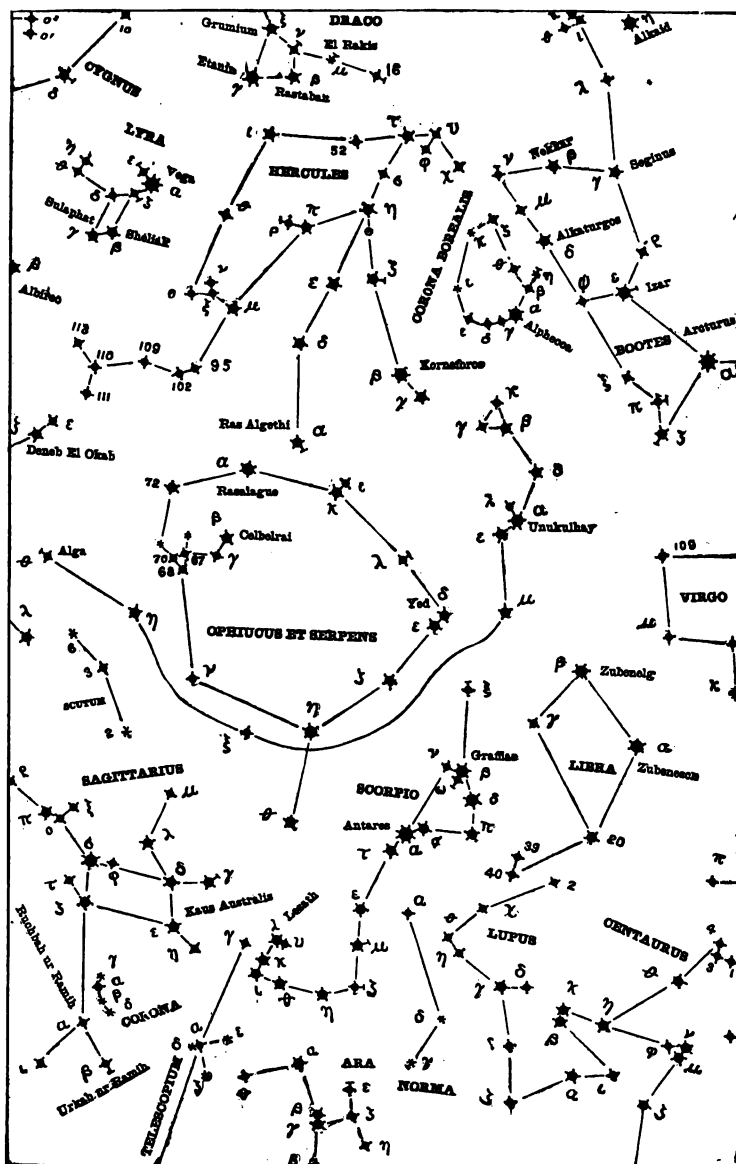
$\alpha$  is south of the limit of this map. Binary, with period of 78 years. The nearest star to our sun. Distance nearly 20,000,000,000,000 miles. Is 14h. 31m. 8s. South  $60^{\circ} 19'$ . June 14.

Crux, the Cross, is a part of Centaurus.  $\gamma$  is 12h. 24m. 15s. South  $56^{\circ} 25'$ .

## LUPUS — The Wolf. 24 stars.

$\gamma$  is 15h. 26m. 49s. South  $40^{\circ} 45'$ . June 28.

The Milky Way passes from Argo, eastward through Crux; divides at  $\beta$  in Centaurus, and turns northward to Scorpio.



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Y AND AUGUST. 25

Colbert, E.  
The fixed stars.

b. 155 stars.  
 ° 46'. July 13.  
 ' 32'. July 24.  
 th the naked eye.

ars.

August 14.

wn. 26 stars.

une 28.

**'3 stars.**

y 29.

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August 18.

SCORPIO — The Scorpion. 44 stars.

*a*, Antares. 16h. 21m. 45s. South 26° 9'. July 12.

$\lambda$ , Lesath. 17h. 25m. 8s. South  $37^{\circ} 1'$ . July 28.

**ARA**—The Altar. 9 stars.

$\alpha$  is 17h. 22m. 11s. South  $49^{\circ} 46'$ . July 27.

The Milky Way passes from  $\beta$  in Centaurus, through the eastern part of Lupus, and Norma; then to Scorpio, where it has a breadth of  $21^\circ$ , from  $\tau$  to  $\iota$ , with numerous gaps. It then divides; the western branch passes through Ophiucus; the eastern branch includes  $\gamma$ ,  $\lambda$ , and  $\mu$  in Sagittarius, and crosses Scutum to Alga.





## SAGITTARIUS — The Archer. 69 stars.

$\sigma$  is 18h. 47m. 31s. South  $26^{\circ} 27'$ . August 18.

$\gamma$ , double. 17h. 57m. 3s. South  $29^{\circ} 35'$ . August 5.

$\beta$ , Urkab ur Ramih, double. 19h. 13m. 39s. South  $44^{\circ} 42'$ .

## CAPRICORNUS — The Goat. 45 stars.

$\alpha^2$ , Secunda Giedi. 20h. 11m. 7s. South  $12^{\circ} 56'$ . September 8.

$\delta$  is 21h. 40m. 8s. South  $16^{\circ} 42'$ . October 1.

## AQUILA — The Eagle. 82 stars. Old.

Antinous (a youth) is a modern addition to the constellation.

$\alpha$ , Altair. 19h. 44m. 41s. North  $8^{\circ} 32'$ . September 1.

$\lambda$  is 18h. 59m. 37s. South  $5^{\circ} 5'$ . August 21.

## SAGITTA — The Arrow. 16 stars.

Nearly midway between Albireo and Altair.

## VULPECULA — The Fox ; or, VULPECULA ET ANSER — The Fox and Goose. 37 stars. Modern.

$\alpha$  is  $3^{\circ}$  south from Albireo.

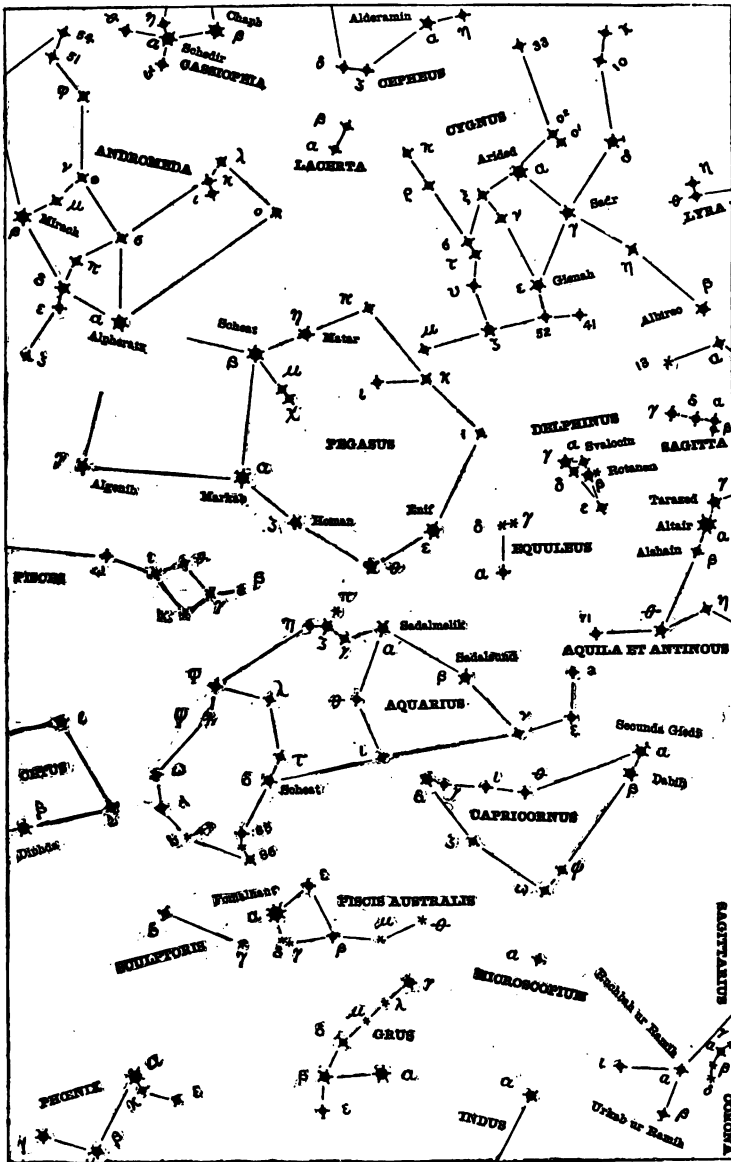
## MICROSCOPIUM — The Microscope. 10 stars. Modern.

$\alpha$  is 20h. 42m. 10s. South  $34^{\circ} 15'$ . September 16.

## CORONA AUSTRALIS — The Southern Crown. 12 stars.

$\alpha$  is 19h. 0m. 58s. South  $38^{\circ} 6'$ . August 21.

The Milky Way is double in this region. The western branch passes through Ophiucus, and over Albireo to Arided. The eastern branch includes  $\lambda$  and  $\gamma$  in Aquila, and  $\gamma$  and  $\delta$  in Sagitta; uniting with the other near Arided; then passes through Lacerta.



## PEGASUS — The Winged Horse. 108 stars.

$\alpha$ , Markab. 22h. 58m. 32s. North  $14^{\circ} 32'$ . October 20.

$\gamma$ , Algenib. 0h. 6m. 48s. North  $14^{\circ} 29'$ . November 7.

$\epsilon$ , Enif. 21h. 38m. 3s. North  $9^{\circ} 18'$ . September 30.

Markab, Algenib, Scheat and Alpheratz, form the Square of Pegasus.

## EQUULEUS — The Little Horse. 13 stars.

$\delta$  is  $7\frac{1}{2}^{\circ}$  west from Enif.

## DELPHINUS — The Dolphin. 20 stars.

$\beta$ , Rotanen. 20h. 31m. 42s. North  $14^{\circ} 10'$ . September 13.

## TELESCOPIUM — The Telescope. 9 stars. Modern.

$\gamma$  is  $3^{\circ}$  east from Lesath. (Page 102.)

$\alpha$  is 18h. 17m. 42s. South  $46^{\circ} 2'$ . August 10.

## AQUARIUS — The Water-Bearer. 108 stars.

$\alpha$ , Sadalmelik. 21h. 59m. 22s. South  $0^{\circ} 56'$ . October 5.

$\beta$ , Sadalsund. 21h. 24m. 59s. South  $6^{\circ} 7'$ . September 27.

$\delta$ , Scheat. 22h. 48m. 1s. South  $16^{\circ} 29'$ . October 18.

$\zeta$  (binary),  $\gamma$ ,  $\eta$ , and  $\pi$  form the Y of Aquarius.

## PISCIS AUSTRALIS — The Southern Fish. 24 stars.

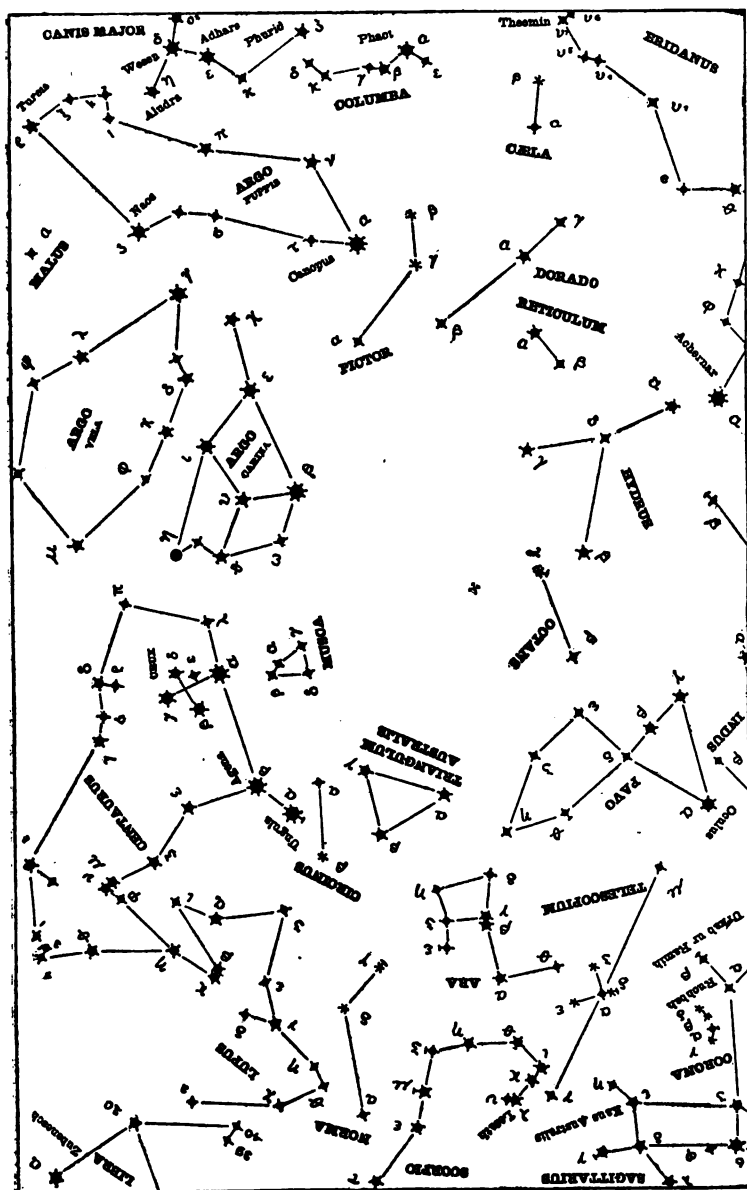
$\alpha$ , Fomalhaut. 22h. 50m. 44s. South  $30^{\circ} 17'$ . October 18.

## GRUS — The Crane. 14 stars. Modern.

$\alpha$  is 22h. 0m. 20s. South  $47^{\circ} 34'$ . October 6.

The Milky Way passes from Arided, through Lacerta; and includes  $\zeta$  and  $\delta$  in Cepheus; with all the stars in Cassiopea that are shown on this map.

On the two following maps the small cross ( $\times$ ) indicates the position of the south pole. The Milky Way passes between Aludra and Tureis; includes Naos,  $\gamma$ ,  $\delta$ ,  $\iota$ , and  $\eta$ , in Argo;  $\alpha$ ,  $\epsilon$ , and  $\beta$  in Crux;  $\beta$  in Centaurus;  $\alpha$  in Circinus;  $\eta$  in Lupus; and  $\tau$ ,  $\epsilon$ ,  $\mu$ ,  $\zeta$ , and  $\theta$  in Scorpio; passing just north from  $\epsilon$  and  $\alpha$  in Ara.





## THE MOST PROMINENT PLANETS.

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**VENUS.** — The following are approximate times of Inferior Conjunction. Greatest elongation east is 70 days before, greatest elongation west is 70 days after, these dates:

July 9, 1892.	July 8, 1900.	July 5, 1908.	July 3, 1916.
Feb. 16, 1894.	Feb. 14, 1902.	Feb. 12, 1910.	Feb. 9, 1918.
Sept. 18, 1895.	Sept. 17, 1903.	Sept. 15, 1911.	Sept. 12, 1919.
April 28, 1897.	April 27, 1905.	April 24, 1913.	April 22, 1921.
Dec. 1, 1898.	Nov. 29, 1906.	Nov. 27, 1914.	Nov. 24, 1922.

**MARS.** — The following are approximate times of Opposition to the Sun, on the meridian at midnight; crosses the meridian above the pole at 9 P.M. about 35 days after these dates:

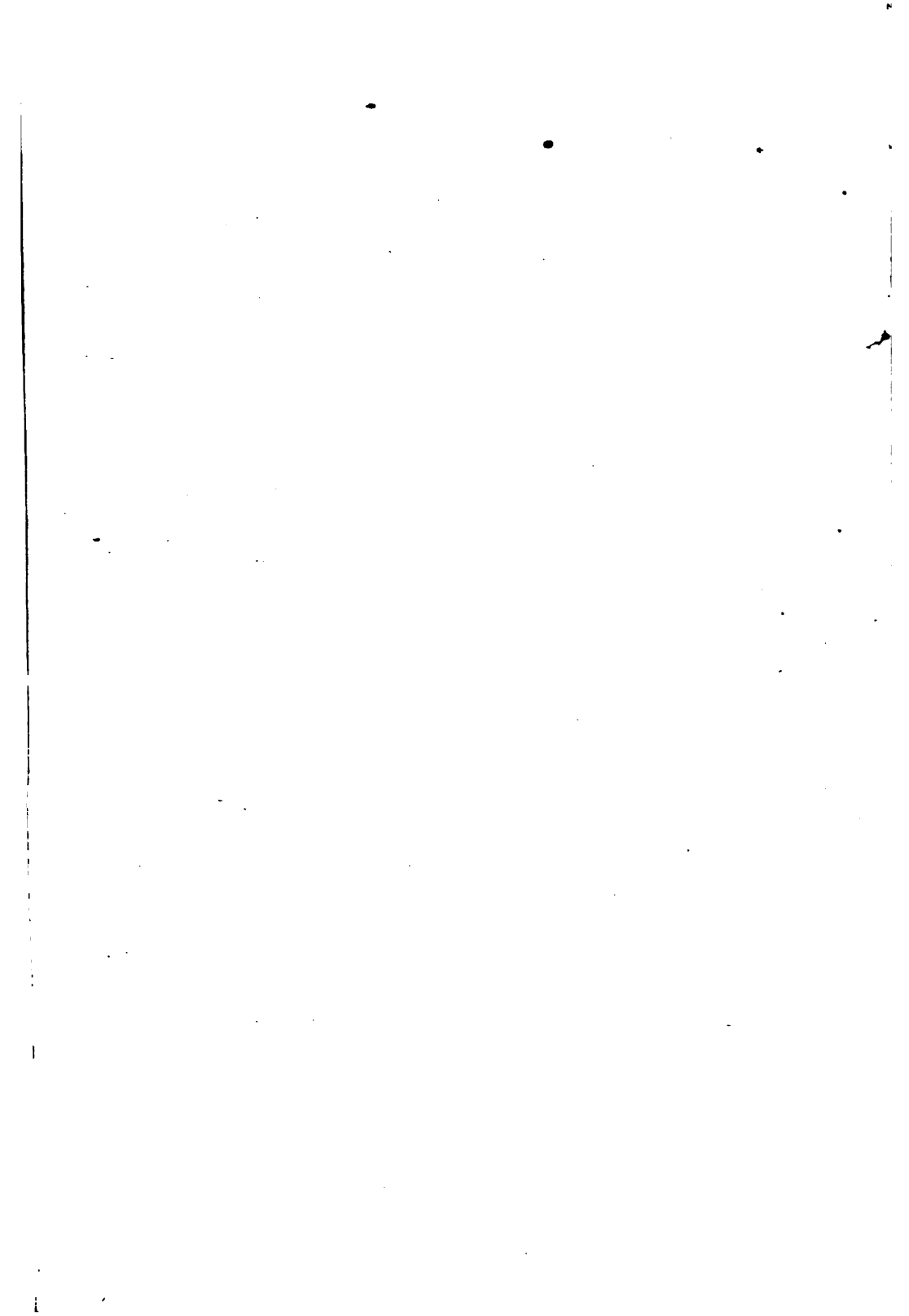
Aug. 3, 1892.	Feb. 21, 1901.	Sept. 24, 1909.	Mar. 14, 1918.
Oct. 20, 1894.	Mar. 27, 1903.	Nov. 24, 1911.	April 20, 1920.
Dec. 10, 1896.	May 8, 1905.	Jan. 5, 1914.	June 9, 1922.
Jan. 19, 1899.	July 4, 1907.	Feb. 8, 1916.	Aug. 23, 1924.

**JUPITER.** — The following are approximate times of Opposition to the Sun; is on the meridian above the pole at 9 P.M. about 40 days after these dates:

Oct. 12, 1892.	May 27, 1900.	Jan. 29, 1908.	Sept. 17, 1915.
Nov. 18, 1893.	June 30, 1901.	Feb. 28, 1909.	Oct. 24, 1916.
Dec. 22, 1894.	Aug. 5, 1902.	Mar. 30, 1910.	Nov. 29, 1917.
Jan. 24, 1896.	Sept. 12, 1903.	April 30, 1911.	Jan. 1, 1919.
Feb. 23, 1897.	Oct. 19, 1904.	June 1, 1912.	Feb. 3, 1920.
Mar. 25, 1898.	Nov. 24, 1905.	July 5, 1913.	Mar. 4, 1921.
April 25, 1899.	Dec. 28, 1906.	Aug. 10, 1914.	Apr. 4, 1922.

**SATURN.** — The following are approximate times of Opposition to the Sun; is on the meridian above the pole at 9 P.M. about 44 days after these dates:

Mar. 16, 1892.	June 11, 1899.	Sept. 4, 1906.	Dec. 6, 1913.
Mar. 29, 1893.	June 23, 1900.	Sept. 17, 1907.	Dec. 21, 1914.
April 11, 1894.	July 5, 1901.	Sept. 29, 1908.	Jan. 3, 1916.
April 23, 1895.	July 17, 1902.	Oct. 13, 1909.	Jan. 17, 1917.
May 5, 1896.	July 29, 1903.	Oct. 26, 1910.	Jan. 31, 1918.
May 17, 1897.	Aug. 10, 1904.	Nov. 9, 1911.	Feb. 14, 1919.
May 30, 1898.	Aug. 22, 1905.	Nov. 22, 1912.	Feb. 26, 1920.





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